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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,144	10/31/2003	Dhruva Ranjan Chakrabarti	200313003-1	3438

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FORT COLLINS, CO 80527-2400

EXAMINER
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WU, JUNCHUN

ART UNIT	PAPER NUMBER
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2191

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/699,144	<b>Applicant(s)</b> CHAKRABARTI ET AL.	
	<b>Examiner</b> Junchun Wu	<b>Art Unit</b> 2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/31/2003</u> . | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Claims 1-15 are pending in this application.

#### ***Claims Objection***

2. The claim numbers in the dependent claims are out of order. They should be 3 for claim 4, 4 for claim 5, 8 for claim 9, 9 for claim 10, 10 for claim 11, 11 for claim 12, 12 for claim 13 and 8 for claim 14. The correction is necessary.

#### ***Claim Rejections - 35 USC § 101***

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 8-14 are rejected under 35 U.S.C. 101 because claim limitations are directed towards software per se. The claimed invention is directed to non-statutory subject matter. Apparatus claims fail to recite any hardware features required enabling the functionality.

#### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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6. Claims 1, 2, 4, 5, 7-9, 11, 12, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Ayers et al. ("Aggressive Inlining", 1997, ACM, hereafter "Ayers").

7. For claim 1, Ayers discloses a method of compiling a computer program, the method composing: receiving a plurality of modules of source code (Fig. 1); generating intermediate representations corresponding to the modules (Sec.2.1 1<sup>st</sup> Para. Lines 1-6); extracting a set of data from the intermediate representations to create an inliner summary for each module (sec.2.2 1<sup>st</sup> Para.Lines 1-4 & 3<sup>rd</sup> Para. Lines 1-5); and using the inliner summaries and a globally-sorted working-list based order in an inline analysis phase to determine which call sites in the modules are to be inlined by substituting code from a called module (Sec.2.4 3<sup>rd</sup> Para. Lines 1-4).

8. For claims 2 and 9, Ayers discloses after a call site is determined to be inlined: updating a call graph of the routines (nodes) and call sites (edges); and updating the inliner summaries throughout the call graph, as necessary (Sec.2.3 The Last Para.).

9. For claims 4 and 11, Ayers discloses updating the inliner summaries comprises determining nodes and edges of the call graph that are affected by the inlining of the call site and updating those inliner summaries corresponding to the affected nodes and edges (Sec.2.3 The Last Para. Lines 5-8).

10. For claims 5 and 12, Ayers discloses the edge summaries include at least a call site execution count and a signature type (Sec.2.3 1<sup>st</sup> Para.).

11. For claims 7 and 14, Ayers discloses the inline analysis phase is separate and distinct from an inline transformation phase (Sec. 2.3 1<sup>st</sup> & 2<sup>nd</sup> Para. (i.e. analysis phase for determining which call site is clonable); Sec.2.3 6<sup>th</sup> & 7<sup>th</sup> Para. (i.e. transformation phase for using the results of analysis phase to create clones and fix call sites).

12. For claim 8, Ayers discloses An apparatus for compiling a computer program, the apparatus comprising: a front-end portion configured to receive a plurality of modules of source code (Fig.1), generate intermediate representations corresponding to the modules (Sec.2.1 1<sup>st</sup> Para. Lines 1-6), and extract a set of data from the intermediate representations to generate inliner summaries for the modules (sec.2.2 1<sup>st</sup> Para. Lines 1-4 & 3<sup>rd</sup> Para. Lines 1-5); and a cross-module optimizer configured to use the inliner summaries and a globally-sorted working-list based order to analyze the call sites in an inline analysis phase so as to determine which call sites in the modules are to be inlined by substituting code from a called module (Sec. 1 4<sup>th</sup> Para. & Sec. 2.2 3<sup>rd</sup> Para. Lines 1-5 & Sec.2.4 3<sup>rd</sup> Para. Lines 1-4).

13. For a claim 15, Ayers discloses a computer program product comprising a computer-usable medium having computer-readable code embodied therein, the computer program product being compiled from a plurality of modules of source code using inliner summaries and a globally-sorted working-list based order in an inline analysis phase to determine which call sites in the modules are to be inlined by substituting code from a called module (Sec. 2.2 3<sup>rd</sup> Para. Lines 1-5 & Sec. 2.4 3<sup>rd</sup> Para. Lines 1-4).

*Claim Rejections - 35 USC § 103*

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 3, 6, 10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Ayers and in view of Schmidt (US Patent No. 6,195,793 B1).

16. For claims 3 and 10, Ayers does not teach after the call graph and inliner summaries are updated, re-calculating profitabilities associated with remaining call sites; and re-ordering the working list using the re-calculated profitabilities, but Schmidt teaches re-calculating profitabilities associated with remaining call sites; and re-ordering the working list using the re-calculated profitabilities (Schmidt, col.7 lines 31-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ayer's teachings by adding re-calculating profitabilities associated with remaining call sites; and re-ordering the working list using the re-calculated profitabilities as taught by Schmidt in order to determine whether the alternate call site from working list (i.e. AuxQueue) should be inlined if the priority best call site in AuxQueue is less than a threshold that is acceptable for the original call site after the re-calculating (Schmidt, col.7 lines 39-51).

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17. For claims 6 and 13, Ayers does not teach the node summaries include at least a code size, a routine execution count, and a call-graph height, but Schmidt teaches the node summaries include at least a code size, a routine execution count, and a call-graph height (Schmidt, col.4 lines 26-34).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ayer's teachings by adding the node summaries include at least a code size, a routine execution count, and a call-graph height as taught by Schmidt in order to select good inlining and making accurate estimates of code bloat (Schmidt, col.3 lines 42-50).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junchun Wu whose telephone number is 571-270-1250. The examiner can normally be reached on 8:00-17:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Zhen can be reached on 571-272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Junchun Wu



WEI ZHEN  
SUPERVISORY PATENT EXAMINER